AF/1745

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

In re application of	:	**Confirmation No. 1381**
Giovanni Pietro CHIAVAROTTI et al.	:	Atty Docket No. 2000-1545
Serial No. 09/707,885	:	Group Art Unit 1745
Filed November 8, 2000	:	Examiner M. Ruthkosky
PROCESS FOR PRODUCING AN ELECTRODE AND USE OF THE ELECTRODE	:	

PATENT OFFICE FEE TRANSMITTAL FORM

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

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Sir:

Attached hereto is a check in the amount of $160.00 to cover Patent Office fees relating to filing the following attached papers:

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The Commissioner is authorized to charge any deficiency or to credit any overpayment associated with this communication to Deposit Account No. 23-0975, with the EXCEPTION of deficiencies in fees for multiple dependent claims in new applications.

Respectfully submitted,

Giovanni Pietro CHIAVAROTTI et al.

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APPELLANTS' BRIEF

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Sir:

This is an appeal from the final rejection of claims 15 and 18-20.

1. REAL PARTY IN INTEREST.

The real party in interest is Becromal S.p.A., the Assignee of the above-identified application.

2. RELATED APPEALS AND INTERFERENCES.

There are no related appeals or interferences.

3. STATUS OF CLAIMS.

The only claims pending in the application are claims 15 and 18-20, which are the appealed claims, set forth in the Appendix.

The original claims are 1-31. A Preliminary Amendment was filed with the present application, cancelling claims 1-14 and 21-31, which were prosecuted in the parent application (Serial

No. 09/357,300) following a restriction requirement therein between these claims, which are drawn to a process of producing an impermeable electrode, and claims 15-20, drawn to an electrode material for use in a capacitor/battery. The parent application issued August 6, 2002 as USP 6,428,842.

In the present divisional application, restriction was required between (I) claims 15-17, drawn to an electrolytic capacitor, and (II) claims 15 and 18-20, drawn to a battery. Applicants elected claims 15 and 18-20 drawn to a battery. A divisional application for claims 15-17 drawn to an electrolytic capacitor was filed June 10, 2002 (Serial No. 10/164,570). Accordingly, claims 16-17 were cancelled from the present application, and claim 15 was amended to delete reference to the electrolytic capacitor.

4. STATUS OF AMENDMENTS.

No amendment was submitted after the final rejection.

5. SUMMARY OF THE INVENTION.

As apparent from claim 15 on appeal, which along with claim 18 are the only independent clams in the application, the present invention is directed to an impermeable or substantially impermeable electrode suitable for use in a battery, which comprises a substrate with an impermeable or substantially impermeable conductive layer of graphite on the substrate (paragraph bridging pages 1-2). Similarly, claim 18 is directed to a battery comprising, as a negative electrode, a substrate with an impermeable or substantially impermeable conductive layer of graphite on the substrate (page 5, lines 8-9).

It is known to use metal foils as cathodes in electrolytic capacitors (page 1, line 5). The metal foils are etched, resulting in an increase in the specific capacitance, and electric resistance of the foil (page 1, lines 6-10). However, the etching also results in a loss of mechanical strength in the metal foil, and natural oxidation resulting from etching yields a capacitance which is a function of the dielectric constant of the metal itself and the treatment performed on the metal foil (page 1, lines 10-13).

In contrast to this, according to the present invention, the desired capacitance is attained through the deposition of graphite, and as a result, neither the electric resistance nor the mechanical strength of the metal foil are impaired (page 1, lines 15-17).

Claim 19 is directed to an embodiment of the battery of claim 18, which is a graphite battery having a graphite block and a negative battery case, and wherein the substrate is a metal foil, both sides of the metal foil are covered with a layer of the graphite, and contact is established between the graphite block and the negative case (page 5, lines 10-12).

Claim 20 is directed to another embodiment of the battery of claim 18, which is a lithium battery having separators and a negative battery case, and wherein the substrate is a metal foil placed between the separators and connected with the negative battery case (page 5, lines 13-15).

6. ISSUES.

There is a single issue presented for decision on appeal, which is whether or not claims 15 and 18-20 are anticipated by Yamada et al. (USP 5,723,232) under 35 U.S.C. §102(b).

7. GROUPING OF CLAIMS.

Claims 15 and 18-20 stand rejected under 35 U.S.C. §102(b) as being anticipated by Yamada et al.

The claims of this group do not stand or fall together. Claims 19-20 are separately patentable from the other claims on appeal.

8. ARGUMENT.

As indicated above, the only outstanding rejection against the claims is the rejection of all of the claims on appeal under 35 U.S.C. §102(b) as being anticipated by Yamada et al.

A rejection under 35 U.S.C. §102 for anticipation is proper only where there is "no difference between what is claimed and what is disclosed in the prior art . . ." Ex parte Meyer, 213 USPQ 588. Put another way, a rejection under 35 U.S.C. §102 is proper "only when the claimed subject matter is identically disclosed or described in the prior art." In re Arkley, 172 USPQ 524.

Appellants respectfully submit that the evidence of record does not support a rejection of the claims on appeal for anticipation, as will be apparent from the remarks set forth below.

Claim 15 is directed to an impermeable or substantially impermeable electrode suitable for use in a battery, which comprises a substrate with an impermeable or substantially impermeable conductive layer of graphite on the substrate. Claim 18, the only other independent claim under consideration, is directed to a battery comprising, as a negative electrode, a substrate with an impermeable or substantially impermeable conductive layer of graphite on the substrate.

The Examiner apparently acknowledges that the Yamada et al. reference fails to expressly disclose that the electrode described therein has an impermeable or substantially impermeable conductive layer of graphite, but nevertheless takes the position that the methods for producing the electrodes are the same or similar as between the present invention and Yamada et al., and that the materials of the reference must also inherently be impermeable or substantially impermeable.

Appellants respectfully submit that this conclusion is flawed, because the methods for producing the electrodes are <u>not</u> the same or similar as will be appreciated from the following remarks.

Initially, as indicated above, the parent application of the present divisional application has issued as a patent (USP 6,428,842; copy enclosed). Claim 1 of the patent follows very closely the wording of the description of the process for producing the electrode as set forth in the paragraph bridging pages 1 and 2 of the present application.

In taking the position that the method disclosed in the present application for producing the electrode is similar to that set forth in the Yamada et al. reference, the Examiner specifically notes that Appellants have argued in the present invention that the drying is done at 80-150°C and the heat treatment is at 200-450°C, compared to Comparative Example 1 in Yamada et al., where the drying is done at 60°C and the heat-treatment is at 240°C. The Examiner then concludes that Comparative Example 1 of Yamada et al. anticipates the claims of the present application.

However, the same Yamada et al. reference relied upon by the Examiner in rejecting the claims of the present application, was considered by the Examiner before allowing the now patented claims of the parent application. Considerable discussion was presented, during prosecution of the

parent application, concerning Comparative Example 1 of Yamada et al. The fact that the claims of the parent application, directed to a process for producing the electrode, were allowed over the Yamada et al. reference, after giving due consideration to Comparative Example 1 of this reference, establishes that not only are the processes not the same or similar, but they are patentably distinct from each other.

Yamada et al. disclose a carbon electrode comprising (a) a metal collector as catalyst, (b) a carbon material and (c) graphite particles, wherein the materials (b) and (c) were sintered together on (a) or in the presence of (a). The sintering conditions are not described in the reference, but according to the Examples the sintering is carried out at a temperature of 1,000°C (see e.g., Example 1, column 9, line 53), which is in harmony with the common definition of sintering as a heat incubation at a temperature of about 2/3 to 3/4 of the melting temperature of the involved substances (standard chemical literature).

In contrast to this, the impermeable electrodes suitable for use in a battery according to the present invention are produced in a quite different way. While sintering appears to be an essential process step in the production process for electrodes disclosed by Yamada et al. (see column 6, lines 15-23), the present invention, instead of such a sintering step, employs a drying step at 80-150°C to remove residual solvent and a subsequent heat treatment within a temperature range of 200 to 450°C to readjust the porous structure. These heat treatments are neither equivalent nor comparable to "sintering" as taught by Yamada et al.

Yamada et al. never mentions that the electrode is impermeable or substantially impermeable. Quite to the contrary, the reference actually suggests that the electrode is not impermeable or substantially impermeable, as indicated, for instance, in the disclosure beginning at column 4, line 52, where the reference refers to a porosity of 60-95%, representing the ratio between voids and solids, and the different electric properties ascribed thereto. Reference in this regard is also made to Fig. 4, from which it is apparent that porosities lower than 60% result in reduced electrical properties. The same can be said for the density of the active material.

It is apparent that the electrode of Yamada et al. is a spongy electrode, which permits infiltration of electrolyte through voids between the particles, as illustrated in Fig. 2 of the reference.

This is confirmed by the data in the reference concerning the active substance density of the electrode. Graphite generally has a density of 2.25 g/cm^3. Example 1 of Yamada et al. results in an electrode having an active substance density of only 0.85 g/cm^3 (column 9, lines 66-67); and Comparative Example 1 results in an electrode having an active substance density of only 0.92 g/cm^3 (column 10, line 62). This confirms that the electrode structure is one which can be characterized as foamy or spongy, but certainly not impermeable or substantially impermeable. This characterization of the reference electrode is consistent with Fig. 2 of the reference and Applicants' argument that the electrolyte infiltrates the electrode.

In conclusion thus far, since the Yamada et al. reference fails to expressly disclose that the electrode has an impermeable or substantially impermeable conductive layer of graphite, and since the method for producing the electrode in accordance with the present invention is significantly different (and patentably distinct) from the method for producing the electrode in accordance with Yamada et al., there is no basis for concluding that Yamada et al. discloses an electrode having an impermeable or substantially impermeable conductive layer of graphite.

Response to Advisory Action

In connection with Appellants' arguments concerning the patenting of the parent application directed to a process for making the electrode, the Examiner states that the subject matter of the instant application is to an electrode and not a process for making an electrode. However, since the Yamada et al. reference fails to expressly disclose that the electrode has an impermeable or substantially impermeable conductive layer of graphite, a discussion of the process for producing the electrode in Yamada et al. is relevant to the determination of the patentability of the electrode itself, and since the process for producing the electrode of the present invention is significantly different (patentably distinct) from the Yamada et al. process, Appellants take the position that Yamada et al. does not implicitly disclose the presently claimed electrode.

With regard to the Examiner's reliance on Comparative Example 1 of Yamada et al., as already noted above, considerable discussion was given to Comparative Example 1 of Yamada et al. during prosecution of the parent application, and the fact that the parent application was allowed over

Yamada et al. should be sufficient to establish that Comparative Example 1 does not disclose a process for producing an impermeable or substantially impermeable electrode. Nevertheless, Appellants will now go into a discussion of Comparative Example 1 of Yamada et al.

Thus, Comparative Example 1 of Yamada et al. discloses a process for manufacturing an electrode consisting of the steps of

i) dissolving polyvinylidene fluoride in a solvent of N-methyl-2-pyrrolidone to form a binder solution,

ii) adding special graphite particles with a particle size of 11 μm and a specific surface of 8 m^2/g in a ratio of 100 parts per weight relative to 10 parts by weight of polyvinylidene fluoride to the binder solution,

iii) mixing the graphite particles and binder solution to a paste,

iv) applying the paste on the opposite sides of a copper foil,

v) drying the copper foil onto which the paste was applied at 60°C,

vi) heat-treating the composition at 240°C,

vii) pressing the carbon electrode, and finally

viii) drying the pressed electrode under reduced pressure at 200°C.

Contrary to the position taken by the Examiner in the Advisory Action, this process in Comparative Example 1 of Yamada et al. is not the same as the process employed in the present invention to produce the claimed electrode as discussed above.

With regard to the Examiner's comments concerning porosity in the Advisory Action, Appellants note that the three-dimensional structure of Yamada et al. preferably has a porosity of 60-95 % since, if the porosity is lower than 60 %, the density of the active material is reduced (column 4, lines 52-57). Due to the fact that coating a porous structure typically will lead to a porous coating, the resulting electrode must be porous since the substrate itself as well as the coating is porous. This is also illustrated by Example 2 and Figure 2 of Yamada et al. In Example 2, a mixture of quinoline-soluble component of pitch as carbon precursor and natural graphite particles in a ratio of 25:95 is applied to a foamed nickel substrate and the thus treated substrate is first heat treated at 300°C and afterwards sintered at 1,000°C in an atmosphere of nitrogen. As shown in Figure 2 and

as described in column 10, lines 26-34, the graphite particles 17 have diffused into the pores of the foamed nickel 15 and are coated within the pores with the carbon material 16. But if the graphite particles 17 were able to enter the pores, these particles obviously were smaller than the diameter of the pores of the formed substrate. Consequently, the pores themselves are not blocked with a graphite layer, and accordingly the electrode cannot be impermeable.

Even if, as stated by the Examiner with reference to Hawley's Condensed Chemical Dictionary, sintering will lead to a material with less surface area and high density, it will not lead to impermeable electrodes in a process as disclosed by Yamada et al. since the sintering will only produce the effect that the graphite particles within the pores or on the surface of the foam will provide a smaller surface area after the sintering step. But if the graphite particles get smaller during the sintering step they are not able to block the pores after they are already within the pores, so that the electrode is as porous as the substrate. Consequently, the electrodes disclosed by Yamada are not impermeable, but are permeable.

Separate Patentability Arguments for Claims 19-20

Claim 19, and claim 20 dependent thereon, require that the battery is a graphite battery having a graphite block and a negative battery case, and wherein the substrate is a metal foil, both sides of the metal foil are covered with a layer of the graphite, and contact is established between the graphite block and the negative case.

In the final rejection, the Examiner takes the position that Figure 6 of Yamada et al. anticipates these claims because it shows a battery wherein the case is provided as positive and negative connectors and the electrodes and corresponding case elements are in contact to transfer electrical charge. However, elements 1-8 in Figure 6 are not described in the reference, and for this reason alone, Appellants take the position that Yamada et al. does not anticipate claims 19-20.

9. CONCLUSION.

Anticipation requires that the claimed subject matter be identically disclosed or described in the prior art. Appellants respectfully submit that this requirement is not satisfied by the Yamada et al. reference, because the reference does not disclose or describe an impermeable or substantially impermeable electrode with an impermeable or substantially impermeable layer of graphite. Therefore the claims on appeal are not anticipated by the reference.

This brief is submitted in triplicate with the requisite fee of $160.00 (small entity).

Respectfully submitted,

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APPENDIX - Claims on Appeal.

The claims on appeal are as follows:

15. An impermeable or substantially impermeable electrode suitable for use in a battery, which comprises a substrate with an impermeable or substantially impermeable conductive layer of graphite on the substrate.

18. A battery comprising, as a negative electrode, a substrate with an impermeable or substantially impermeable conductive layer of graphite on the substrate.

19. The battery according to claim 18, which is a graphite battery having a graphite block and a negative battery case, and wherein the substrate is a metal foil, both sides of the metal foil are covered with a layer of the graphite, and contact is established between the graphite block and the negative case.

20. The battery according to claim 18, which is a lithium battery having separators and a negative battery case, and wherein the substrate is a metal foil placed between the separators and connected with the negative battery case.